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Gandhi

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(54) **METHOD AND APPLICATION FOR
CONTROLLING ALIGNMENT OF FIBERS
DURING INJECTION MOLDING PROCESS**

USPC 425/174; 264/437
See application file for complete search history.

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CPC **B29C 45/0005** (2013.01); **B29C 45/1701**
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(58) **Field of Classification Search**
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(56) **References Cited**

U.S. PATENT DOCUMENTS

5,017,312 A 5/1991 Peters et al.
5,846,356 A * 12/1998 Vyakarnam B29C 70/14
156/273.1
7,862,765 B2 1/2011 Hwang et al.
2015/0134061 A1 * 5/2015 Friis H01L 41/37
623/17.11

OTHER PUBLICATIONS

Dr. C. Barry, Template-guided Self-assembly of Conductive Plastic
in an Electric Field during Injection Molding, Research Experiences
for Teachers at Northeastern University, www.ret.neu.edu/NSTA-Baltimore'06/posters/Jessica_Quinn.ppt.

* cited by examiner

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(57) **ABSTRACT**

A method of controlling the orientation of glass or plastic
reinforcing fibers in an injection molded polymeric/fiber
article including the step of applying a high electric field to at
least a portion of the mold cavity during the injection of the
fiber/polymer mix and during a setup or packing time preced-
ing the ejection of the article from the mold.

12 Claims, 2 Drawing Sheets

